

Article Overview

Relay voltage settings define the threshold at which a protective relay detects abnormal voltage conditions and initiates tripping to safeguard equipment.

Overview of Voltage Protection in Relays

Voltage protection relays are designed to detect overvoltage, undervoltage, and voltage imbalance in electrical systems. These relays monitor the system voltage and operate when it exceeds or falls below preset thresholds, ensuring the safety of transformers, motors, and other critical equipment. Proper voltage settings are essential to prevent unnecessary tripping while maintaining system reliability.

Key Parameters for Voltage Setting

- o Pickup Voltage (V_{pickup}) The pickup voltage is the voltage level at which the relay begins to operate. It is typically expressed as a percentage of the nominal system voltage. For example, an undervoltage relay may be set to 85% of nominal voltage, while an overvoltage relay may be set to 110%.
- o Time Delay / Operating Time Voltage relays often include a time-delay setting to avoid tripping for transient voltage fluctuations. The operating time can be fixed (definite time) or inverse (longer delay for smaller deviations) depending on the relay type and coordination requirements.
- o Coordination with Other Relays Voltage settings must be coordinated with current-based relays and downstream protection devices to ensure selective tripping. This involves calculating the pickup voltage, time delay, and relay characteristic curves to avoid simultaneous or unnecessary trips.
- o Scaling and Multiplying Factors In numerical relays, the metering factor (MF) or scaling factor adjusts the relay's response to match the actual system voltage measured through potential transformers (PTs). This ensures accurate operation under varying system conditions.

Calculation and Setting Guidelines

- o Determine the nominal system voltage and the acceptable voltage range for equipment.
- o Select the pickup voltage based on equipment tolerance and system stability.
- o Apply a time delay to prevent tripping during short-term voltage fluctuations.
- o Verify settings using fault level and load flow calculations to ensure the relay operates correctly under all expected conditions.
- o Follow IEC standards such as IEC 60255 for relay performance and IEC 61008/61009 for earth-leakage and voltage protection devices.

Practical Example

For a 11 kV system:

How to set the relay protection voltage

- o Undervoltage relay pickup: 9.35 kV (85% of nominal)
- o Overvoltage relay pickup: 12.1 kV (110% of nominal)
- o Time delay: 0.5-2 seconds depending on coordination with downstream relays These settings ensure that the relay trips only for sustained abnormal voltages, protecting equipment without unnecessary interruptions.

Summary

Relay voltage settings are critical for system protection. They involve selecting the pickup voltage, time delay, and coordination parameters to ensure reliable and selective operation. Proper calculation, adherence to standards, and coordination with other protective devices are essential for effective voltage protection in HV and MV substations .

Plug setting multiplier of relay is referred as ratio of fault current in the relay to its pick up current. Suppose we have

Protection relays Numerical relays are based on the use of microprocessors. The first numerical relays were released in 1985. A big

In this video, I show how to set up a voltage protection relay with your own hands: I set

Protective relays are arguably the least understood component of medium voltage (MV) circuit protection. In fact, some believe that

One example of this is quadrature polarization. In this case, the polarizing voltage is in quadrature to the faulted phase voltage.

Introduction to Protective Relaying What are Protective Relays, or Protection Relays? Protective relays are

Learn how to analyze and set relay control and protection for low- medium- and high-voltage switchgear and substations from

Protective relays are critical components in power systems, providing essential protection for various elements such

Explore the voltage protection relay: Its working principle, functions, and how this vital

Part 1: Protective relay compared to low voltage circuit breaker. Review fundamental concepts, components, and terminology using

How to set the relay protection voltage

To determine stability voltage for through fault V_s " Voltage across the relay at IFS (VS) CT Resistance (RCT)

Relay setting plays an important role in maintaining the reliability of a Power System. Read this blog to find out more

Protective relay functions and data This technical article will cover the gathering of information needed to calculate

To configure protective devices such as making a relay setting, having all the consideration of the fault severity and

Protection Settings The documents presented should serve as a model to various utilities in preparing similar

Protection relays employ a wide range of configurable parameters to identify defects & trip the breaker in a controlled

Web: <https://www.kremgroup.co.za>

